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Size 10 to 32
 Maximum working pressure 350 bar
 Maximum working flow 1600 L/min

#### Features

- Pilot operated proportional directional valve
- Control the direction and size of the flow
- For subplate mounting
- Spring centred control spool
- Operation by proportional solenoids with central thread and detachable coil
- Both valves and proportional amplifiers from the same supplier

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Proportional directional valve/4WRE(E)...2XJ

# Function description, sectional drawing

Pilot control valve model 3DREP6... This pilot valve is a three-way pressure reducing valve controlled by a proportional solenoid. It converts an input signal into a proportional pressure output signal and is used for all valves model 4WRZ... The proportional solenoids are adjustable, DC wet pin solenoids with central threads and detachable coils. The solenoids are controlled by external amplifier (model WRZ...)

# Structure:

The valves consist of:

- Valve body with mounting surface (1)
  Control spool (2) with pressure measuring spools (3 and 4)
- Solenoids (5 and 6) with central threads
- Optional amplifier (7)

#### Operating Principle:

• When the solenoids (5and6) are de-energized, the compression spring (8) holds the control spool (2) in the central position.

• After the proportional solenoid is energized, it will directly push the control spool (2), e.g. energization of the solenoid "b" (6):

 $\rightarrow$ The control spool (2) and pressure measuring spool (3) are pushed to the left in proportion to the electrical input signal.

 →At this time, P to A and B to T are connected through the throttle formed by the spool and the valve body with progressive flow characteristics.
 De-energization of solenoid (6)

 $\rightarrow$ The control spool (2) is pushed back to the central position by the compression spring (8). In the central position of the pilot valve, A and B are connected to T, that means the hydraulic fluid can flow to the tank directly.



Model 3DREP6...-2XJ/

642

## Function description, sectional drawing

Note for model 3DREP6... It must be avoided to drain all the oil in the return line. If necessary, a back pressure valve is to be installed in the circuit (back pressure about 2 bar).



Two position valve (model 3DREP... B...)

In principle, the function of this valve is similar to the valve with three-position. The two position valve is installed with solenoid "a" (5) only, and a screw plug (9) is installed at the position of the second solenoid. Pilot operated proportional directional valve model 4WRZ...

The 4WRZ valve is pilot operated 4-way directional valve which is controlled by proportional solenoids, it controls the direction and size of the flow.

Structure:

The valves consist of:

• Pilot control valve (9) with proportional solenoids (5 and 6)

• Main valve (10) with main valve spool (11) and compression spring (12)

Operating principle:

When the solenoids (5 and 6) are de-energised, the compression spring (12) holds the main valve spool (11) in the central position.

 $\rightarrow$ The action of the main valve spool (11) is controlled by the pilot valve (9), the main valve spool is proportional moved, e.g. by means of solenoid "b" (6).



 $\rightarrow$ Firstly, the control spool (2) is pushed to the right, the pilot oil is fed through the pilot valve (9) into the pressure chamber (13) and moves the main spool (11) in proportion to the electrical input signal.

• At this time, P to B and A to T are connected through the throttle formed by the spool and the valve body with progressive flow characteristics.

• The pilot oil required for the pilot valve can be supplied internally through port P or externally through port X.

 $\rightarrow$ When the solenoid (6) is de-energized, the control spool (2) and main valve spool (11) will return to the central position.

• Depending on the different position of the main valve spool, P to A and B to T or P to B and A to T are connected. The optional manual emergency operations (14 and 15) with protective cap allow the pilot valve (2) to move when the solenoid is not energized.

Attention! Inadvertent activation of manual emergency operation may cause the equipment movement out of control.

- 7X

Models and specifications

4WR

more information in text

No code=

V=

sealing material

NBR seals

FKM seals

#### Function description, sectional drawing

7ekith 肺束

Externally controlled pilot operated proportional directional valve, model 4WRH... The model WRH... is a pilot proportional directional valve controlled by an external pressure regulating valve.

Structure:

The valves consist of:

 Main valve (10) with main valve spool (11) and compression spring (12)

Adapter board (16)

Working principle:

The adapter board (16) connects the control port A to control port T (Y) and the control port B to port P (X). The pilot pressure of the main valve must not exceed 25 bar.

### **Functional symbols**

With electro-hydraulic operation and for external amplifier

With electro-hydraulic operation and for integrated amplifier

Model 4WRZE...-7XJ/...

Model 4WRZ...-7XJ/...

X=external Y=external

Model 4WRZE7XJ/E	Г
	X=internal



With hydraulic operation





16

10

Model 4WRH...-7XJ/





X=external

Y=external



0



Model 4WRZE.A...-7XJ/...ET...



Model 4WRH...A..-7XJ/...



hvdraulic =H operation electro-hydraulic operation =Z for external electronics =No code with integrated electronics =E size 10 =10 size 16 =16 =25 size 25 =32 size 32 symbols a 0 b a 0 b A1= F1-W8-K4= X = 1 = w9-K31= A E a 0 P X XIII  $= EA^{2}$ No code= N.F 区時  $= W6A^{2}$ E= with symbols E1- and W8-: P→A: q<sub>vmax</sub> FT=  $B \rightarrow T: q_{v/2}$  $P \rightarrow B: q_{v/2}$ T= A→T: q<sub>vmax</sub> with symbols E3- and W9-: No code=  $P \rightarrow A: q_{vmax} B \rightarrow T: closed$ No code=  $P \rightarrow B: q_{v/2} A \rightarrow T: q_{vmax}$ N9= (When forming a differential circuit, the bottom interface G24= of the hydraulic cylinder should be connected to port A) .J= note: For spools W6-, W8-, 7X= W9 and W6A, when in neutral

(consult for other seals) No code= without pressure reducing valve D31) = with pressure reducing valve ZDR6DP0-4X/40YM-W80 (fixed setting) electrical connection For 4WRZE: command value input  $\pm$  10 V F1= command value input 4 to 20mA for WRZ and WRH No code= electrical connections for model 4WRZ... without plug in connector for model 4WRZE... plug-in connector supply and drain of pilot oil pilot oil supply external drain external pilot oil supply internal drain external pilot oil supply internal drain internal pilot oil supply external drain internal without special protection no manual emergency operation with hidden manual emergency operation electronic control supply voltage 24V DC (standard) 6E= pilot valve, proportional solenoid with detachable coil Rekith 70 to 79 series (installation and connection size unchanged) nominal flow rate at valve pressure difference  $\triangle$  P=10bar 25= 50= 85= size 10

100=

220=

360=

150=

325=

520=

size 16

size 25

size 32

1) Not used for 4WRH and 4WRZ without pilot valve

2) Not applicable for model 4WRH

position, a connection from A

to T and B to T with less than

2% of the relevant nominal

cross-section.

# Technical parameters

Overview									
Valve model	Valve model			.WRZ .WRZE			.WRZE		
Installation pos	sition			Optional, firstly horizontal					
Storage tempe	rature range		°C	-20 to +80					
Environment te	Environment temperature range °C		- 20 to + 70			- 20 to + 50			
Weight -Subpla	ate mounting	size 10	kg	7.8			8.0		
	size 16		kg	13.4			13.6		
		kg	18.2			18.4			
		size 32	kg		42.2			42.2	
Hydraulic	(Measured at p	ressure P=1	100 bar a	and using H	−LP46,ϑ₀ii=	40°C±	5°C)		
size			size	10	16	25	;	32	
Working press	ure								
- Pilot valve	External pilot o	oil supply	bar		30	to 100			
	Internal pilot o	il supply							
			bar	100 to					
				"D3"		100 to 350 with "D3"			
Main valve port P. A. B. bar		Up to 315	Up to 350	Upto	350	Up to 350			
Return flow	Port T (port R)						50	11.1.150	
pressure	(External pilot o	il drain)	bar	Up to 315	Up to 250	Upto	50	Up to 150	
	Port T (Internal pilot oil	drain)	bar	Up to 30	Up to 30	Up to 3	30	Up to 30	
	Port Y	arany	bar	Up to 30	Up to 30	Up to 3	30	Up to 30	
Flow of the ma	Flow of the main valve L/min		Up to 170	Up to 460	Upto	870	Up to 1600		
Control oil flow in port X and Y L/min		2.5		. 7	-	15.0			
with stepped input signal (0 $\rightarrow$ 100 %)			3.5	5.5	1		15.9		
Pilot oil volume	Pilot oil volume for reversing of cm <sup>3</sup>		1.7	4.6	10	)	26.5		
the main valve	the main valve 0 →100 %								
Fluid		Mineral oil (HL, HLP) <sup>1)</sup> in accordance with DIN 51524;							
		Fast living organisms degraded oil according to VDMA 24568: HETG (Rapeseed oil) <sup>1)</sup> : HEPG							
°C		(Polyethyleneglycol) <sup>2)</sup> ; HEES (Synthetic Fats) <sup>2)</sup>							
Oil temperatur	Oil temperature range		-20 to +80 (preferably +40 to +50)						
Viscosity range mm <sup>2</sup>		20 to 380 (preferably 30 to 46)							
The maximum allowable pollution degree of the oil									
- Pilot valve		Class 18/16/13							
	- Main valv	/e		Class 20/18/15					
Hysteresis			%		≤	6			

The oil must meet the cleanliness degree requested by the components in the hydraulic system. Effective oil filtration can prevent failure and increase the service life of the components.

# Technical parameters

Electrical					
Valve model			.WRZ	.WRZE	
Valve protection to EN	Valve protection to EN60529		IP65, plug installed and locked		
Voltage type	Voltage type		DC		
Command value over	ommand value overlap %		15		
Maximum current		А	1.5	2.5	
Solenoid coil (	Cold value at 20°C	Ω	4.8	2	
resistance Maximum warm value		Ω	7.2	3	
Power rate		%	6 100		
Maximum coil temper	rature	°C	150		
Electrical connection WRZ			With component plug and plug-in connector to DINEN 175301-803		
WRZE			With component plug and plug-in connector to DINEN 175201-804		
Control electronics			1		
Internal amplifier for model 4WRZE			Integrated in the valve		
Current consumption	l max	А	-	1.8	
	Impulse current	А	-	3	
Command value signal	Voltage input "A1"	V	-	±10	
	Current input "F1"	mA	-	4 to 20	
External amplifier for model 4WRZ					
Modular amplifier		RT-PVDA-OX-D2-30-CN-A1/F1			

#### Characteristic curve



### Transition performance of the valve when the input signal is a step signal, measured at Pst=50 bar



# Characteristic curve



 $1 \triangle P=10$  bar constant  $2 \triangle P=20$  bar constant  $3 \triangle P=30$  bar constant  $4 \triangle P=50$  bar constant  $5 \triangle P=100$  bar constant





 $1 \triangle P=10$  bar constant  $2 \triangle P=20$  bar constant  $3 \triangle P=30$  bar constant  $4 \triangle P=50$  bar constant  $5 \triangle P=100$  bar constant

#### $\triangle$ P=valve pressure difference (inlet pressure P<sub>p</sub>minus load pressure P<sub>1</sub> and minus return oil pressure P<sub>1</sub>)

Transition performance of the valve when the input signal is a step signal, measured at Pst=50 bar



Size 16

## Characteristic curve

(Measured when using HLP46,  $\vartheta_{oil}$ =40°C ± 5°C)

Size 25

The nominal flow rate 220L/min at 10 bar valve pressure difference



 $1 \triangle P=10$  bar constant  $2 \triangle P=20$  bar constant  $3 \triangle P=30$  bar constant  $4 \triangle P=50$  bar constant  $5 \triangle P=100$  bar constant

The nominal flow rate 325L/min at 10 bar valve pressure difference





Transition performance of the valve when the input signal is a step signal, measured at Pst=50 bar



(Measured when using HLP46,  $\vartheta_{\rm oil}$ =40°C ± 5°C)

30

15 20

40



 $1 \triangle P=10$  bar constant  $2 \triangle P=20$  bar constant  $3 \triangle P=30$  bar constant  $4 \triangle P=50$  bar constant  $5 \triangle P=100$  bar constant



50

Command value (%)→

60

70

80

90 100



 $1 \triangle P=10$  bar constant  $2 \triangle P=20$  bar constant  $3 \triangle P=30$  bar constant  $4 \triangle P=50$  bar constant  $5 \triangle P=100$  bar constant

 $\triangle$ P=valve pressure difference (inlet pressure P<sub>p</sub>minus load pressure P<sub>1</sub> and minus return oil pressure P<sub>1</sub>)

Transition performance of the valve when the input signal, measured at Pst=50 bar



Size 32

650

Electro-hydraulic proportional directional valve/4WRZ(E)...7XJ

13/18

#### Component size

Model 4WRZ(E)16...-7XJ/...

Size unit: mm

5×Φ10.5max

### Size unit: mm

Model 4WRZ(E)10...-7XJ/...

Component size















Required surface finishing of mating components

## Valve fixing screw

4xM10x60-10.9 grade GB/T70.1-2000 Tightening torque M<sub>A</sub>=60Nm 2xM6x55-10.9 grade GB/T70.1-2000 Tightening torque M<sub>A</sub>=13.7Nm

17 Valve connection surface

Electro-hydraulic proportional directional valve/4WRZ(E)...7XJ

Component size

Model 4WRZ(E)32...-7XJ/...

15/18

Size unit: mm

### Component size

Size unit: mm

. . . . .



d f

114.3

190.5





1 Main valve 2 Pilot valve 3 Size of model 4WRZ.... 4 Size of model 4WRZE.... 5 Proportional solenoid "a" 6 Proportional solenoid "b" 7 Plug "A" 8 Plug "B" 9 Plug-in connector

10 Interconnection plate (for 4WRH...) 11 Plug for valve with one solenoid 12 Name plate for pilot valve 13 Name plate for main valve 14 Built-in amplifier (OBE) 15 Pressure reducing valve "D3" 16 Space required to remove the plug 17 Valve connection surface



Valve fixing screw 6xM20x80-10.9 grade GB/T70.1-2000 Tightening torque M<sub>a</sub>=373Nm

Tightening torque M<sub>▲</sub>=95Nm

## **Electrical connections**

Model 4WRZ...2XJ/...(Without built-in amplifier)

Component plug connection form The plug-in connector to DINEN 175301-803 or ISO4400



Model 4WRZE...2XJ/...(With built-in amplifier)

The plug-in connector to DINEN 175201-804



#### Model 4WRZE...(With built-in amplifier)

#### Terminal identification of plugs

A	Terminal identification	Contact	A1 signal	F1 signal	
B	Supply	А	24VDC(19~35V)		
C	voltage	В	GND		
D		С	no connection <sup>1)</sup>		
E	Differential	D	$\pm 10V$ , Re>50K $\Omega$	4~20mA, Re>100Ω	
F	amplifier input	E	Reference potential		
- <b></b>		F	no connection <sup>1)</sup>		

#### Command value:

A positive command value 0 to 10V (or 12 to 20mA) at D and E causes a flow from P to A and B to T. A negative command value 0 to -10V (or 12 to 4mA) at D and E causes a flow from P to B and A to T. For valves only with one solenoid in side "A" (symbols EA and WA), a positive command value at D and E causes a flow from P to B and A to T.

#### Connecting cable:

Recommendation:

Cable length up to 25m, model LiYCY 5x0.75mm<sup>2</sup>

- Cable length up to 50m, model LiYCY 5x1.0mm<sup>2</sup>
- The external diameter of the cable is 6.5 to 11mm
- The connection of screen to PE on the supply side only.

<sup>1)</sup>Contacts C and F are not allowed to be connected together.

# Control oil supply

#### Model 4WRZ... -.../ pilot oil supply external Model 4WRH... -.../ pilot oil drain external

In this construction, the pilot oil is supplied from a separate control circuit (supply external). The pilot oil return via port Y separately (drain external) but not through the port "T" of main valve.

#### Model 4WRZ... -.../...E...pilot oil supply internal pilot oil drain external

In this construction, the pilot oil is supplied from port P of the main valve

(supply internal).

1 and 2: Plug M6

pilot oil supply

Size 10

The pilot oil return via port Y separately (drain external) but not through port T of main valve. Ports "Y" in the subplate is closed.

## Model 4WRZ... -.../...ET...pilot oil supply internal pilot oil drain internal

In this construction, the pilot oil is supplied from port P of the main valve (supply internal). The pilot oil return to port T of main valve directly (drain internal).

# Ports "X" and "Y" in the subplate are both closed.

#### Model 4WRZ... -.../...T...pilot oil supply external pilot oil drain internal

In this construction, the pilot oil is supplied from a separate control circuit (supply external). The pilot oil return to port T of the main valve (drain internal).

Port "Y" in the subplate is closed.



Pilot oil supply external: 1 closed internal: 1 open Pilot oil return external: 2 closed internal: 2 open

Pilot valve

Main valve

Sectional position





Pilot oil supply external: 9 closed internal: 9 open Pilot oil return external: 10 closed internal: 10 open



Pilot oil supply external: 11 closed internal: 11 open Pilot oil return external: 10 closed internal: 10 open